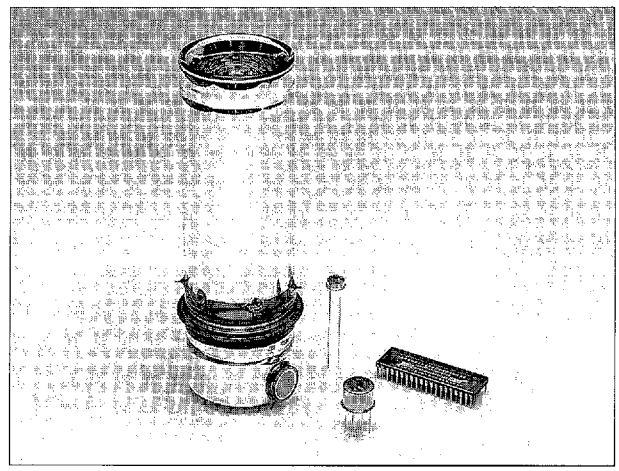
PbSe Photoconductive Detectors

Capable of detecting to 5 μm range (TE-cooled types)

- **High-speed response**
- **Operates at room temperature**
  Compared to other types of detectors used in the same wavelength range, PbSe cells have higher response speed and can also operate at room temperature, making them useful in a wide range of applications such as gas analyzers. (Cooled types are provided for higher precision photometry.)
- **Lower temperature detection limit: Approx. 50 °C**

PbSe cells operates on the same principle as in PbS cells, but can be used to detect longer wavelengths up to or over 5 μm. In particular, TE-cooled types ensure stable and reliable measurement over extended time periods.



Noncooled Types

These devices operate at room temperature, making them easy to use in a variety of applications.

Multielement Types

Multielement types include 4-element and 16-element linear arrays as standard items.

Cooled Types

Thermoelectrically-cooled devices and glass dewar devices are available. Cooling a PbSe cells enhances the responsivity and improves the S/N ratio, thus cooled types are widely used in precision photometry for applications such as in analytical instruments.

- **SPECIFICATIONS (Common)**

Peak wavelength	3.8 μm (element temperature 25 °C)
Cutoff Wavelength	4.8 μm (element temperature 25 °C)
Window Material	Bandpass filter (P3207 series)
	Sapphire glass (other than P3207 series)
Thermistor Allowable Dissipation	0.2 mW
Peltier Element Allowable Current	1.5 A (one-stage TE-cooled types)
	1.0 A (two-stage TE-cooled types)
Maximum Supply Voltage	100 V
Operating Temperature	-30 to +50 °C
Storage Temperature	-55 to +60 °C

- **ACCESSORIES (Optional)**

Heatsink for one-stage TE-cooled types : A3179
Heatsink for two-stage TE-cooled types : A3179-01
Temperature controller for TE-cooled types : C1103-04
Preamplifier for PbS/PbSe cells : C3757-02
Housing for glass dewar devices : A3262-02
(Dewar devices are available potted in the housing upon request.)

(Typical data unless otherwise specified)

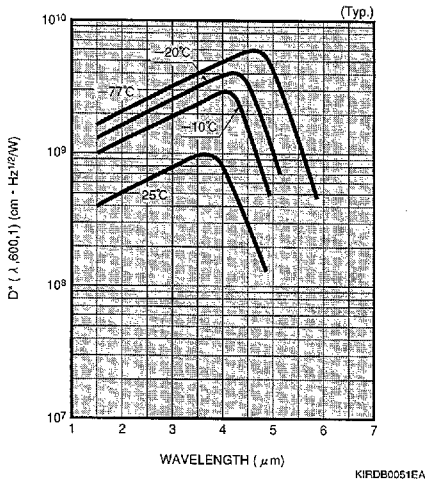
Type No.	Outline No. (P.34-36)	Package	Active Area (mm)	Element Temperature (°C)	Photo Sensitivity S λ=λp Vs=15 V (V/W)	Signal Ⓐ Min. (μV)	Signal Ⓐ Typ. (μV)	Noise Ⓑ N Typ. (μV)	Noise Ⓑ N Max. (μV)	D* (500, 600, 1) Min. (cm·Hz^1/2/W)	D* (500, 600, 1) Typ. (cm·Hz^1/2/W)	D* (λp, 600, 1) (cm·Hz^1/2/W)	Rise Time tr 0 to 63 % (μS)	Dark Resistance Rd (MΩ)
Non-cooled Types														
P791	⑯	2-pin TO-5	1×5	25	8×10²	50	70	1.5	3	5×10⁷	1×10⁸	1×10⁹	1 to 3	0.1 to 0.6
P791-01		2-pin TO-5	1×3	25	1×10³	50	70	1.5	3	5×10⁷	1×10⁸	1×10⁹	1 to 3	0.2 to 1
P791-02		2-pin TO-5	3×3	25	5×10²	50	70	1.5	3	5×10⁷	1×10⁸	1×10⁹	1 to 3	0.35 to 2
P791-03		2-pin TO-5	2×5	25	4×10²	50	70	1.5	3	5×10⁷	×10⁸	1×10⁹	1 to 3	0.2 to 0.8
P791-11	⑲	3-pin TO-5	2×2	25	1×10³	50	70	1.5	3	5×10⁷	1×10⁸	1×10⁹	1 to 3	0.7 to 1.6
P3207-04	⑳	2-pin TO-5	1×2	25	5×10²	–	–	1.5	3	–	–	–	1 to 3	0.3 to 1
Multi-element Types														
P4115	㉑	Cooled TO-66	1×1 (4 element)	-10	1×10⁴	150	200	2.5	5	1×10⁸	3×10⁸	3×10⁹	2 to 5	1.5 to 7
One-stage TE-cooled Types														
P2038-01	❹	6-pin TO-8	1×3	-10	4×10³	150	200	2	4	1×10⁸	3×10⁸	3×10⁹	2 to 5	0.5 to 5
P2038-03		6-pin TO-8	3×3	-10	1×10³	150	200	2	4	1×10⁸	3×10⁸	3×10⁹	2 to 5	1.7 to 7
Two-stage TE-cooled Types														
P2680	❺	6-pin TO-8	1×3	-20	5×10³	180	280	2	4	2×10⁸	4×10⁸	4×10⁹	2 to 5	0.5 to 5
P2680-01		6-pin TO-8	3×3	-20	2×10³	180	280	2	4	2×10⁸	4×10⁸	4×10⁹	2 to 5	1.8 to 8
Glass Dewar Types														
P5169	⑭	Glass dewar	1×5	-77	5×10³	400	500	2	4	4×10⁸	7×10⁸	6×10⁹	40 to 100	0.1 to 10

Ⓐ Light source : 500 K blackbody
Chopping frequency : 600 Hz
Supply Voltage : 15 V
Load resistance : Nearly equal to the element dark resistance.
Incident energy : 16.7 μW/cm²

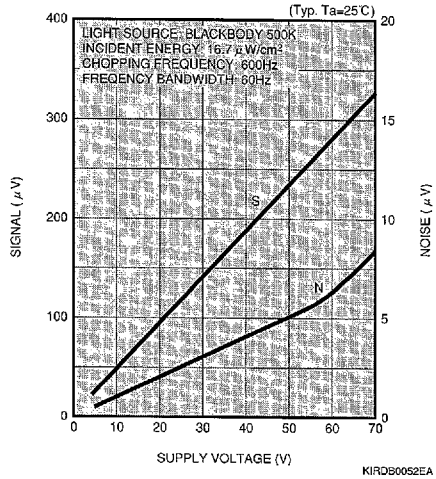
Ⓑ Chopping frequency : 600 Hz
Noise bandwidth : 60 Hz
Supply Voltage : 15 V
Load resistance : Nearly equal to the element dark resistance.

Spectral Response 1.5 to 5.8 μm

● Spectral Response

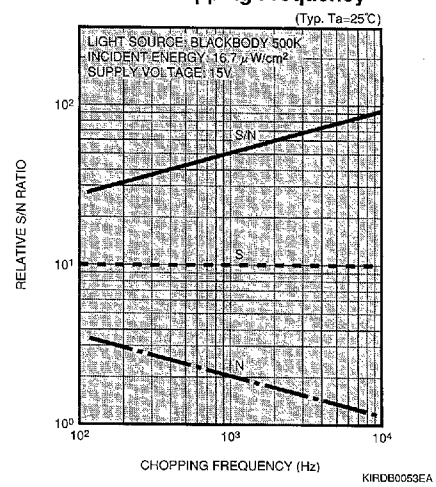


● S/N Ratio vs. Supply Voltage



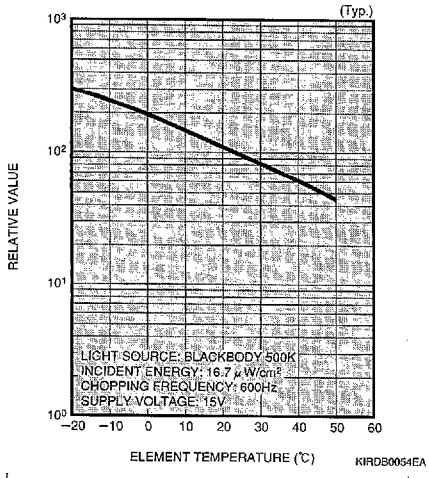
If a voltage higher than 60 V is applied, the noise increases exponentially, degrading the S/N ratio. The device should be operated at 60 V or less.

● S/N Ratio vs. Chopping Frequency



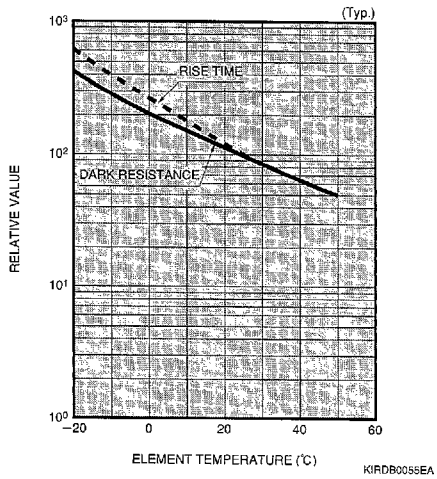
Increasing the chopping frequency reduces the 1/f noise and results in an improved S/N ratio. The S/N ratio can also be improved by narrowing the noise bandwidth using a lock-in amplifier.

● Responsivity vs. Temperature

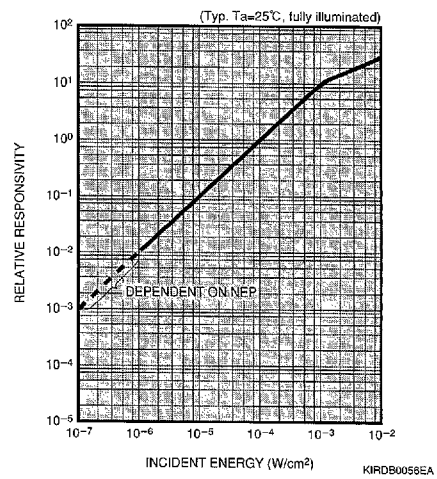


Cooling the device enhances its responsivity. But the responsivity also depends on the load resistance in the circuit.

● Dark Resistance, Rise Time vs. Temperature

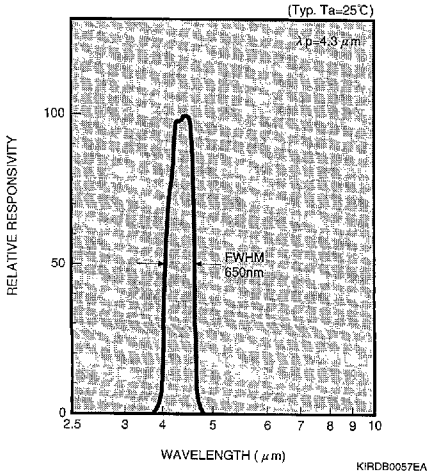


● Linearity



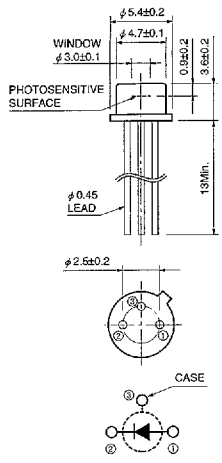
When the incident light spot is smaller than the active area, the upper limit of the linearity becomes lower.

● Spectral Response (P3207-04)



Dimensional Outlines (Unit: mm)

❶ G3476-01, etc.



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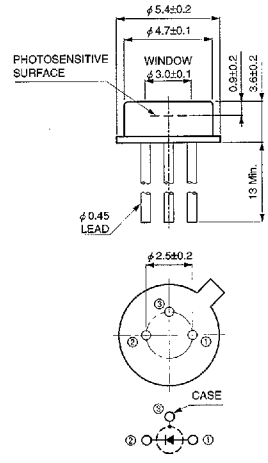
❷ G5832-02, -03



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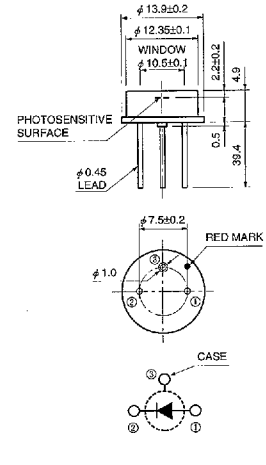
❸ G5832-05, etc.



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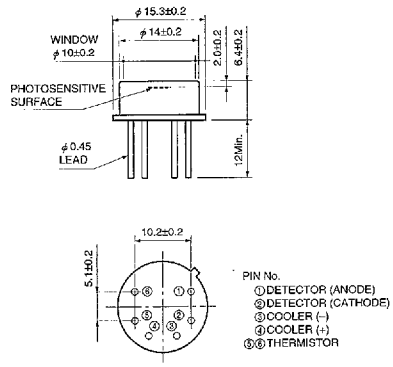
❹ G5832-11, etc.



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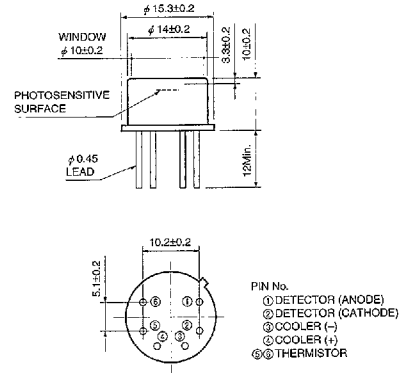
❺ G5832-21, etc.



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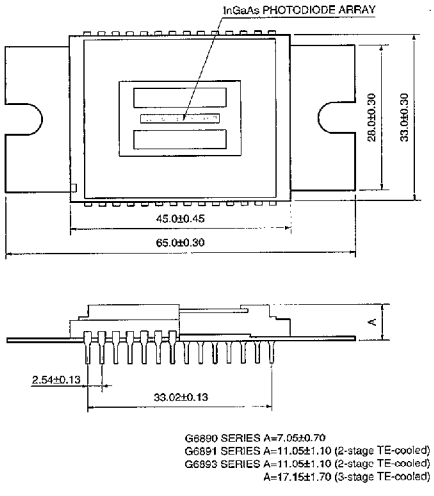
❻ G6890-128, etc.



G6890 SERIES A=7.05±0.70
G6891 SERIES A=11.05±1.10 (2-stage TE-cooled)
G6893 SERIES A=11.05±1.10 (2-stage TE-cooled)
A=17.15±1.70 (3-stage TE-cooled)

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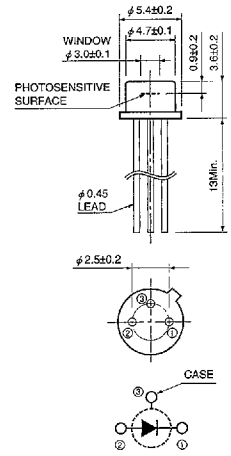
❼ B1720-02, etc.



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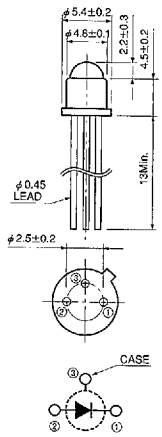
⑧ B1720-05



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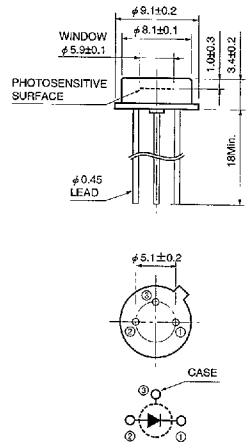
⑨ B2144-01, etc.



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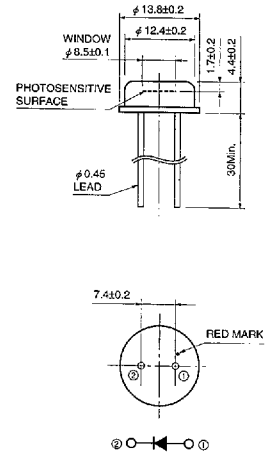
⑩ B1919-01



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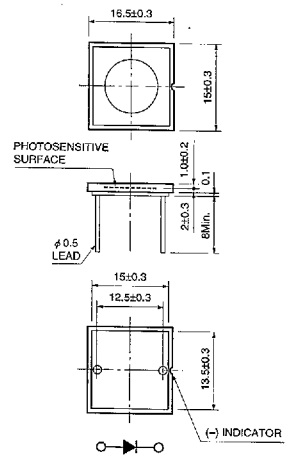
⑪ B1920-01



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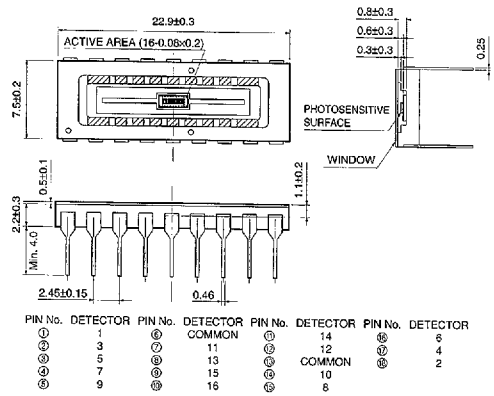
⑫ G7151-16



PIN No.	DETECTOR	PIN No.	DETECTOR	PIN No.	DETECTOR	PIN No.	DETECTOR
①②③	1	⑥	COMMON	⑪	14	⑯	6
④	3	⑦	11	⑫	12	⑰	4
⑤	5	⑧	13	⑬⑭	COMMON	⑱	2
⑨	7	⑨	15	⑮	10		
⑩	9	⑩	16	⑯	8		

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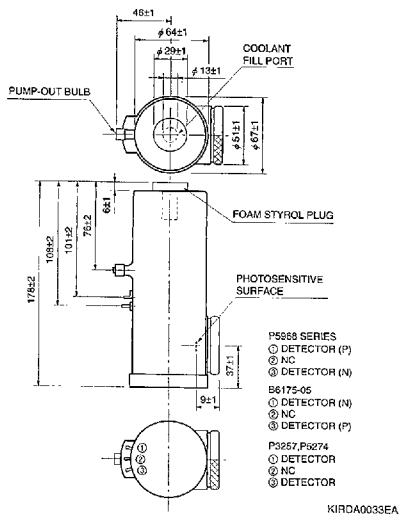
⑬ P5968 series, P7163, B6175-05, etc.



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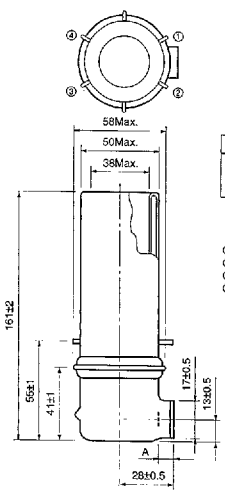
⑭ P5138, etc.



Type No.	A
P5168, P5169	7±1
P5171, P5172 SERIES	8±1
P5138 SERIES	9±1

① DETECTOR(N) WEIGHT:115g
② DETECTOR(P)
③ NC
④ NC

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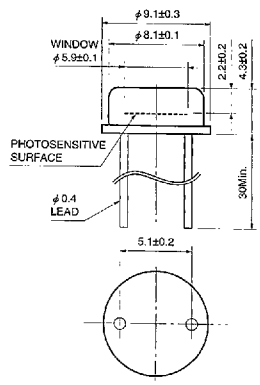
⑮ P394



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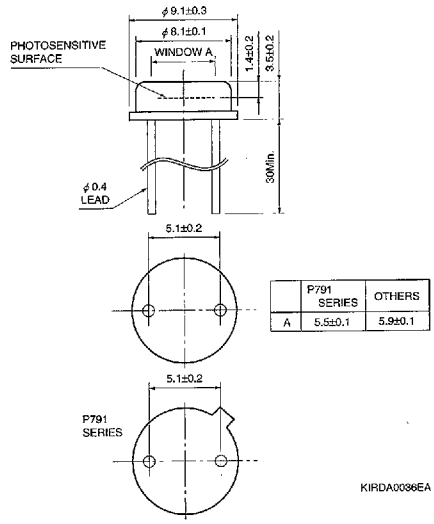
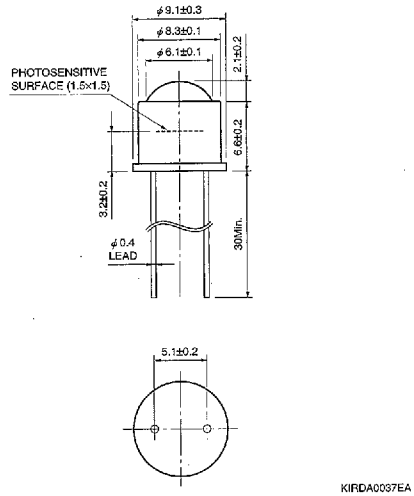
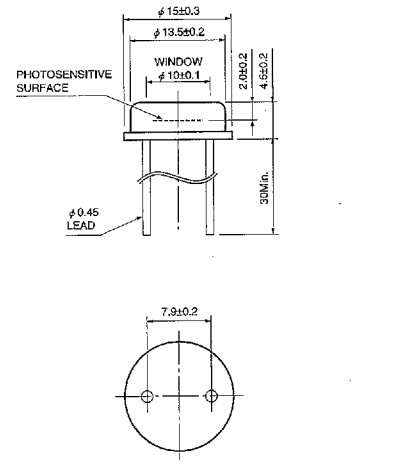
⑯ P394A, etc.



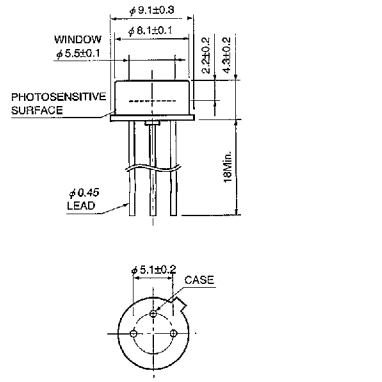
⑰ P3226-02



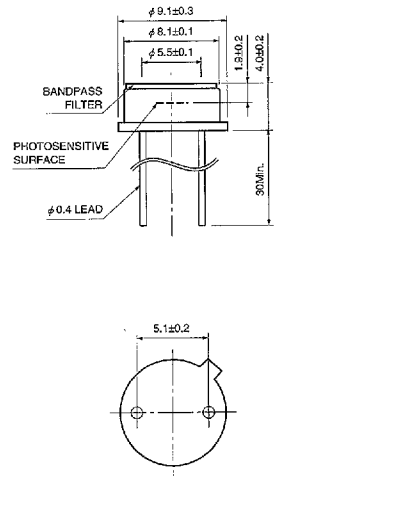
⑱ P397



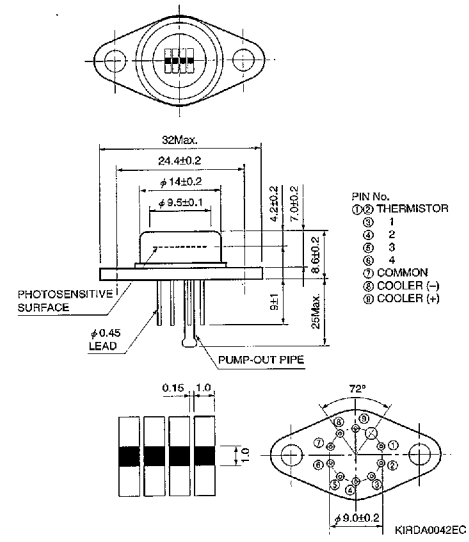
⑲ P791-11



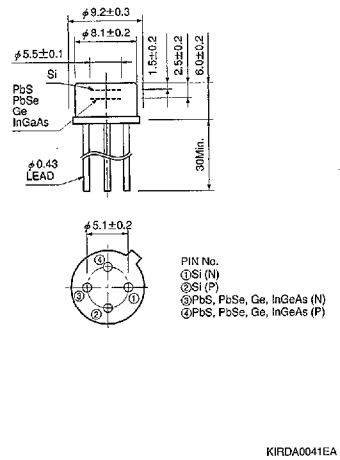
⑳ P3207-04



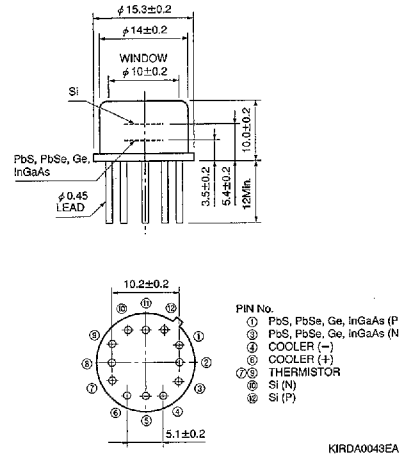
㉑ P4115



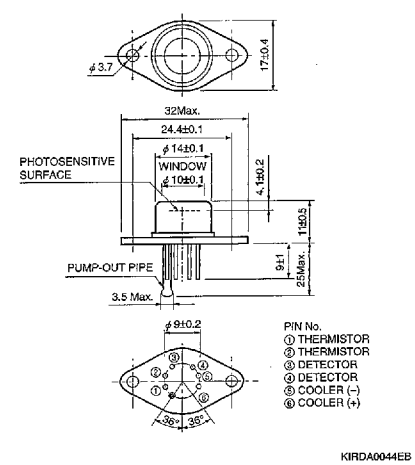
㉒ K1713-01, etc.



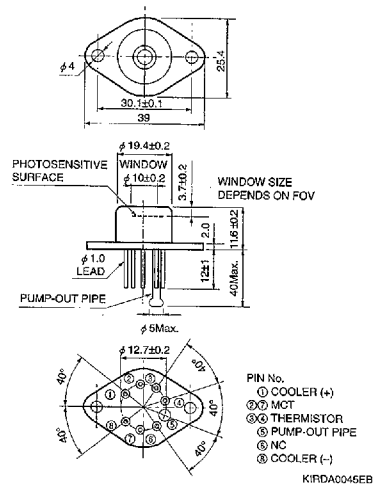
㉓ K3413-01, etc.



㉔ P3981-01, etc.



㉕ P2750, etc.



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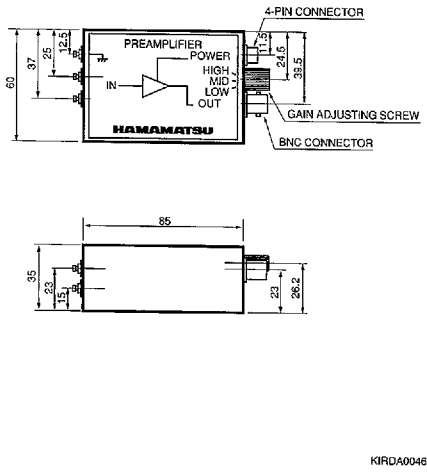
㉖ C4159, -01, -03



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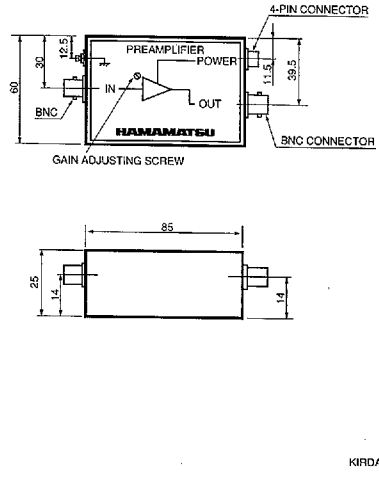
㉗ C4159-02



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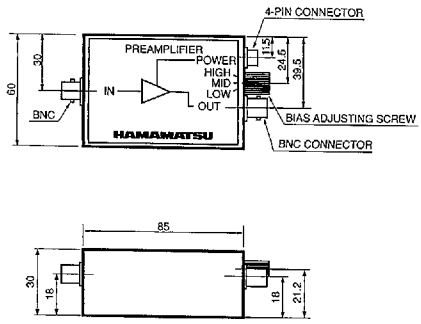
㉘ C5185, -01



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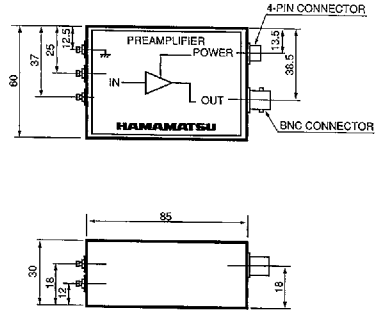
㉙ C3757-02



KIRDA0049EA